R E P O R T R E S U M E S

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RECESSED AUTOMATIC SURFACE SKIMMERS FOR SWIMMING POOLS.
NATIONAL SANITATION FOUNDATION STANDARD NUMBER 11.
NATIONAL SANITATION FOUNDATION, ANN ARBOR, MICH.

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THE NATIONAL SANITATION FOUNDATION STANDARD ON SWIMMING POOL EQUIPMENT CONCERNS ITSELF WITH THE SUCCESSFUL APPLICATION OF SURFACE SKIMMERS TO SWIMMING POOLS. THE MINIMUM DESIGN AND CONSTRUCTION REQUIREMENTS ESTABLISHED BY THIS STANDARD ARE SET FORTH TO PROVIDE A MEANS OF EVALUATING THE OVERALL CONSTRUCTION AND EFFECTIVENESS OF THE UNIT. ADDITIONAL CONCERN IS GIVEN TO THE FACTORS RELATING TO THE APPLICATION OF SURFACE SKIMMERS AND THEIR INTEGRATION INTO THE OVERALL HYDRAULIC PERFORMANCE OF THE CIRCULATORY SYSTEM. SURFACE SKIMMERS REMOVE DIRT AND OIL LADEN FILM FROM THE SURFACE OF THE SWIMMING POOL THROUGH A CONTINUOUS REMOVAL PROCESS. THE SURFACE DRAW DEPENDS ON A COMBINATION OF SURFACE TENSION, EFFECTIVE VELOCITY, AND WIND DRIFT EFFECTS. THIS SPECIFICATION IS DIVIDED INTO FOUR SECTIONS--(1) GENERAL SCOPE, (2) DEFINITIONS, (3) MATERIALS OF CONSTRUCTION, AND (4) DESIGN AND CONSTRUCTION. RECOMMENDATIONS FOR INSTALLATION ARE ALSO GIVEN. (RH)

ED019842

NATIONAL SANITATION FOUNDATION

STANDARD NUMBER 11

Relating to

RECESSED AUTOMATIC SURFACE SKIMMERS

for

SWIMMING POOLS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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Prepared by the

NATIONAL SANITATION FOUNDATION COMMITTEE

FOR

SWIMMING POOL EQUIPMENT STANDARDS

As Amended

October 1965

THE NATIONAL SANITATION FOUNDATION
Headquarters
SCHOOL OF PUBLIC HEALTH - UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN

EF 001 788

THE NATIONAL SANITATION FOUNDATION

PURPOSE

In 1944, a small group of industrial and public health leaders were discussing mutual problems involving sanitation. They realized that modern sanitation problems affecting industry and the public health could be best solved through mutual understanding and cooperative action to produce sound, effective educational programs and to foster public knowledge, rather than through ordinances, inspections and law enforcement alone.

It occurred to them that great strides could result from the creation of an independent but authoritative liaison organization which would be a clearing house through which business, industry and health authorities could work together for the solution of common problems and for the common good.

They realized that through such an organization they could foster the research and educational programs so essential to keeping abreast of the technological advances of industry, with modern products and services, and with the daily lives of the people.

Thus was born the National Sanitation Foundation with Headquarters in the School of Public Health of the University of Michigan at Ann Arbor, Michigan.

The National Sanitation Foundation is a non-commercial, non-profit, organization seeking solutions to all problems involving cleanliness and sanitation. It is dedicated to the prevention of illness, the promotion of health and the enrichment of the quality of American living through preplanning of preventative programs for the improvement of the environment.

The National Sanitation Foundation fulfills the important purpose of arranging for a common meeting ground where industry and public health may discuss and solve common problems.

PROGRAM

The program of the National Sanitation Foundation charted in 1948 at the National Sanitation Clinic, by some 500 of the nation's leading public health authorities and business and industrialists encompasses the following basic areas of activity:

BASIC AND APPLIED RESEARCH: The need for an enlarged research program in the field of environment was recognized by the Clinic as pressing. Many problems and uncertainties are currently answered by a multiplicity of curbstone opinion. Only through seeking out and defining the answers thereto, can sanitation attain the status it deserves.

STANDARDS: The need for uniform equipment standards was pointed out by both industry and public health groups. Seven National Sanitation Foundation Standards have been developed, and additional Standards are in various stages of completion. These Standards, based on scientific fact, have been developed on a cooperative basis by representatives of industry and professional public health officials, and are the result of comprehensive study and review by all concerned groups.

TESTING LABORATORY: The need for an independent testing laboratory where applied research relative to sanitation methods, materials and equipment, could be conducted objectively, had been expressed many times by industry and public health. The 1948 Clinic emphasized that such a laboratory, where tests may be made, and, when merited, approval given, would serve as a valuable contribution to the improvement of environment throughout the country. The National Sanitation Foundation Testing Laboratory was established in 1952 to fulfill this need, and serves both industry and public health sanitation interests.

SEAL OF APPROVAL: A Seal of Approval, or some means of identifying items of equipment or devices meeting high public health standards was specified, by the Clinic, to be an urgent need. Following the establishment of the National Sanitation Foundation Testing Laboratory, an official Seal of Approval was adopted and may be authorized for use by industry, on equipment found to conform with National Sanitation Foundation Standards. A continuing program of evaluation for equipment, devices or products authorized to bear the Seal and annual renewal of the authorization is required.

EDUCATION: Only through an adequate program of education is it possible to translate the results of research to health officials, business and the public. THE AMERICAN INSTITUTE OF ENVIRONMENT was formed for expressed purpose of implementing and conducting basic and applied research activities in the fields of education, methodology, working relationships and communications between the public, industry, academic interests, professional public health workers and official agencies.

PREFACE

This Standard, covering Recessed Automatic Surface Skimmers is one series of NSF Standards for Swimming Pool Equipment. These Standards are being developed and issued in recognition of the need for a common understanding of the problems of sanitation involving industry and administrative health officials whose obligation it is to enforce regulations.

This Standard is the result of considerable study on the part of public health officials, consultations with technical representatives of industry, and investigations of the National Sanitation Foundation's staff. The improvement of environmental health and sanitation and the establishment of uniform requirements have been the primary aim in the preparation of this Standard. However, it is recognized that continued technicological progress will require periodic changes.

The adoption of these Standards offers health officials an opportunity to present a united front in securing the basic equipment necessary for the safe and efficient operation of swimming pools, private or public. It gives users of such filters the assurance of meeting health standards and of satisfactory performance when properly operated. Also, they give manufacturers the advantage of applying uniform design and construction methods with confidence that equipment conscientiously built to meet these Standards will be generally acceptable.

Finally, as an aid to all concerned in recognizing approved equipment, the National Sanitation Foundation Testing Laboratory has established a program under which the use of its insigne, nSf, can be authorized on skimmers that meet the requirements herein established for Recessed Automatic Surface Skimmers.

Permission to use the National Sanitation Foundation Testing Laboratory's Seal of Approval is granted only after evaluation of the applicant's manufacturing methods and performance testing of his filters, shows compliance with the Standard. Continuance of the use of the nSf Seal of Approval is dependent upon continued evidence of compliance with the Standard upon periodic re-evaluation of equipment in factory and field.

Sincere appreciation is extended to all members of the Committees herein listed who so willingly devoted their time to the development of this and other Standards. Special credit and thanks are due the members of the Subcommittee for Recessed Automatic Surface Skimmers and of the NSF Committee for Swimming Pool Equipment Standards for the long hours spent in review, discussion and correspondence, as well as to the Industry Advisory Committee for its untiring efforts in this work.

NATIONAL SANITATION FOUNDATION COMMITTEE

for

NATIONAL SANITATION FOUNDATION SWIMMING POOL EQUIPMENT STANDARDS

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Malcolm C. Hope, U.S. Public Health Service, Washington 25, D.C. (Liaison Representative)
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David B. Lee, Florida State Board of Health, Jacksonville 1, Florida (Conference of State Sanitary Engineers)
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Henry J. Ongerth, California State Department of Public Health, Berkeley 4, California (Special Public Health Consultant)
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Alternate for W.K. Rodman - D.B. Knudson, Federal Housing Administration, Washington 25, D.C.

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Donald Doughty, Orinda Pools, Inc., Lafayette, California (NSPI Rep.)
Robert Steel, National Swimming Pool Institute, Washington 6, D.C. (NSPI Representative)
Duncan E. Britt, Jr., D.E. Britt Associates, Fort Lauderdale, Florida (NSPI Representative)
E.P. Wagner, E.L. Wagner Company, Darien, Connecticut (NSPI Representative)

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H.A. Whittaker, National Academy of Sciences, Washington, D.C.

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Wilson Bow, Washington State Department of Health, Seattle, Washington
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Robert B. LaBelle, Calhoun County Health Department, Battle Creek, Michigan
Howard A. Peters, Omaha-Douglas County Health Department, Omaha, Nebraska
Dale E. Pierce, 1208 So. 8th Street, Sheboygan, Wisconsin
E. Douglas Pushard, Clark County Health Department, Los Vegas, Nevada
Lee N. Reed, Palm Beach County Health Department, West Palm Beach, Florida
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Curt T. Mosley, M.D., State Department of Health, Oklahoma City, Oklahoma
R. L. Cleere, M.D., State Department of Public Health, Denver, Colorado

Committee on Swimming Pool Equipment
Conference of State Sanitary Engineers

David Lee, State Board of Health, Jacksonville, Florida
Walter A. Lyon, Pennsylvania Department of Health, Harrisburg, Pennsylvania

Committee on Swimming Pool Equipment
American Public Health Association Joint Committee

Chairman, C. W. Klassen, Department of Public Health, Springfield, Illinois
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Henry F. Eich, Los Angeles City Health Department, Los Angeles, California
Walter A. Lyon, Pennsylvania Department of Health, Harrisburg, Pennsylvania
John E. Kiker, Jr., University of Florida, Gainesville, Florida
Malcolm C. Hope, U.S. Public Health Service, Washington, D.C.

SUGGESTIONS CONCERNING REGULATIONS

GOVERNING

RECESSED AUTOMATIC SURFACE SKIMMERS

It is strongly recommended that these Standards representing a cross-section of opinion of workers in the field of environmental health be accepted and followed by enforcement officials. However, their incorporation in detail into local sanitary codes does not appear to be necessary and is likely to be cumbersome.

In municipalities, counties, and health districts in which the adoption of legislation by reference is considered legal, the following regulation should serve to implement the use of the Standard for Recessed Automatic Surface Skimmers.

> ALL RECESSED AUTOMATIC SURFACE SKIMMERS INSTALLED ON OR AFTER _____ IN PUBLIC OR PRIVATE SWIMMING POOLS IN THIS JURISDICTION SHALL MEET THE NATIONAL SANITATION FOUNDATION STANDARDS FOR SUCH EQUIPMENT.

or, if considered desirable, it will be simpler to adopt the following or general regulation applying to all standards in the swimming pool equipment field:

> ALL SWIMMING POOL EQUIPMENT INSTALLED ON OR AFTER _____ FOR USE IN PUBLIC OR PRIVATE SWIMMING POOLS IN THIS JURISDICTION SHALL MEET THE APPLICABLE NATIONAL SANITATION FOUNDATION STANDARDS.

In fact, the adoption of this broad regulation will save time as well as advertising and printing costs, as no doubt, many different standards will be adopted. Otherwise, each standard will require the adoption of a specific regulation.

Wherever, the legality of adopting legislation by reference is not recognized, delete the portion of either of the above regulations after the word "SHALL" and substitute therefore the words "BE OF A TYPE APPROVED BY THE HEALTH OFFICER." The health officer may be guided by the National Sanitation Foundation Standards in his approval of types.

NSF SWIMMING POOL EQUIPMENT STANDARD

Relating to

RECESSED AUTOMATIC SURFACE SKIMMERS

INTRODUCTION

The successful application of surface skimmers to a swimming pool is dependent on several factors. The minimum design and construction requirements established in this Standard are set forth to provide a means of evaluating the overall construction and effectiveness of the unit. Equally important, however, are factors related to the application of the surface skimmer to the pool and its integration into the overall hydraulic performance of the circulatory system.

Surface skimmers remove the dirt and oil laden film from the surface of a swimming pool through a process of continuous removal. The surface draw depends on a combination of surface tension, effective velocity and wind drift effects. Properly applied, surface skimmers do an excellent job of maintaining a clean water surface over a broad range of operating conditions and thus contribute materially to the overall satisfactory performance of the pool. This is due, of course, in no small part to the removal of floating dirt, insects, leaves, oil films, or suspended particles in the upper strata of the pool water.

SECTION 1. GENERAL

1.00 SCOPE: Only recessed automatic surface skimmers are covered in this Standard. The units herein described are intended to be used for swimming pools both public and residential. Included are the basic components which may be a part of a surface skimmer such as the skimmer housing, strainer basket, weir, ring and cover, equalizer valve or air lock protector, trimmer valve and flow balancing valves for multiple skimmer installations, and vacuum cleaning connections. Recommended procedures for installation and operation of skimmers on public and residential pools are made.

1.01 MINIMUM REQUIREMENTS: These Standards are established as a guide to the evaluation of equipment covered herein, and are considered to be basic and minimum requirements. Variations are permissible when they tend to make the equipment more resistant to corrosion, wear and physical damage, or if they improve the general operation and performance of the device. Variations shall be approved prior to their use.

1.02 ALTERNATE MATERIALS: Where specific materials are mentioned, it is understood that the use of other materials proven to be equally satisfactory, for the intended end use will be acceptable.

1.03 REVIEWS AND REVISIONS: Following adoption of the Standard and prior to its printed publication, a general review shall be carried out by the National Sanitation Foundation Committee for Swimming Pool Equipment Standards to determine the adequacy and appropriateness of the requirements; and to ascertain if additional requirements

are indicated. Subsequent to the printed publication of this Standard, complete review of the Standard shall be conducted at intervals of not more than three years to determine what changes, deletions or additions, if any, are necessary to maintain current and effective requirements consistent with new technology and progress. These reviews shall be conducted by appropriate representatives from the public health, industry and user groups. Final adoption of revisions shall be in accordance with the procedures established by the NSF Committee for Swimming Pool Equipment Standards.

SECTION 2. DEFINITIONS

2.00 APPROVED: Found acceptable for the specific use as determined by the National Sanitation Foundation, when related to the use of the nSf Seal of Approval.

2.01 ACCESSIBLE: Readily exposed for proper and thorough cleaning, inspection or replacement with the use of only simple tools, such as a screw driver, pliers or wrench.

2.02 COVER MOUNTING RING: A fitting containing a recess placed in the deck to receive the cover of the surface skimmer.

2.03 EFFECTIVE VELOCITY: The velocity necessary to entrain and transport surface film and debris.

2.04 EQUALIZER PIPE: A connection with an automatic valve from the skimmer tank to the pool sufficiently below the weir and of adequate size to satisfy pump demand and prevent airlock.

2.05 EQUALIZER VALVE: A device on the equalizer line which will open when the water level inside the skimmer tank drops below the operating level and will remain closed during normal skimming.

2.06 FRESH WATER: Those waters having a specific conductivity less than a solution containing 6000 ppm of sodium chloride.

2.07 FLOW BALANCE VALVE: A manually operated device to regulate the effluent from the skimmer housing of each of a combination of 2 or more surface skimmers.

2.08 SALINE WATERS: Those waters having a specific conductivity in excess of a solution containing 6000 ppm of sodium chloride.

2.09 SKIMMER HOUSING: The structure to which the skimmer weir is attached or in which it is contained. It also houses the strainer basket, and other devices pertinent to the skimmer operation.

2.10 SKIMMER COVER: The device, or lid, used to close the deck opening to the skimmer housing.

2.11 STRAINER BASKET: A perforated or otherwise porous container within the skimmer housing used to catch leaves and other coarse material to prevent entrance into the pool piping.

2.12 TOXIC: The word "toxic" shall refer to the adverse physiological effect to man.

2.13 TRIMMER VALVE: A flow adjusting device which is used to proportion flow between that over the weir and through the main suction line from the main outlet or the vacuum cleaning line.

2.14 VACUUM CLEANER CONNECTION: A connection within the skimmer by means of which the vacuum cleaning operation at the pool may be accomplished by attaching a hose.

2.15 WEIR ASSEMBLY: The floating device over which the surface water from the pool passes during the skimming operation along with its means of guiding or attachment to the skimmer.

SECTION 3. MATERIALS OF CONSTRUCTION

3.00 GENERAL: Any suitable material may be employed that will meet the requirements of corrosion resistance, durability, structural rigidity, normal handling and shipping as outlined herein, and a material that shall be safe and shall not produce any toxic effect or impart undesirable taste, odors, or color to the pool water.

3.01 CORROSION RESISTANT MATERIALS: Corrosion resistant materials will be accepted without coating for wetted surfaces. The following is a list of presently accepted materials: (1) approved copper alloys (including bronze and brass), (2) AISI type 300 series stainless steel, (3) monel, (4) approved synthetic (certain plastics, fiberglass, etc.) materials, (5) approved concrete.

3.02 NON-CORROSION RESISTANT MATERIALS: Non-corrosion resistant metals shall be provided with adequately applied and durable protective coating completely covering all wetted surfaces.

3.03 DISSIMILAR METALS: Dissimilar metals not normally considered compatible on the electromotive scale shall not be in direct contact in the skimmer construction.

3.04 FILTER PIPING MATERIALS - FRESH WATER APPLICATION: For fresh water applications approved plastic, galvanized steel or iron pipe with cast or malleable iron fittings and bronze or iron bodied bronze fitted valves may be used in the skimmer piping without protective coating.

3.05 PIPING MATERIALS - SALINE WATER APPLICATIONS: Piping for saline water applications shall be of the following corrosion-resistant materials: aluminum brass*
90-10 cupro-nickel
70-30 cupro-nickel
Monel Alloy 400
Approved PVC, ABS & PE plastics
Alternate materials may be approved under the provisions of Item 1.02 of this Standard.

*Should not be used where velocities in excess of 8 fps.

3.06 INSULATING FITTINGS: Insulating fittings shall be provided when the piping material is not compatible on the electromotive scale with the material of the skimmer. Insulating fittings shall be electrically non-conductive and if made of synthetic (plastic) must be of an approved material.

SECTION 4. DESIGN AND CONSTRUCTION

4.00 HOUSING: The skimmer housing shall be of such structural design and construction as to be resistant to deformation during installation and shall be designed to withstand the water pressure developed by the weight of water contained therein. Additional strength and rigidity factor shall be considered to withstand deformation due to shipping, handling, placement or installation. Units that may be closed during part of their operating cycle shall, in addition, be designed to withstand the crushing pressure developed by a vacuum of 25" of mercury with a safety factor of 1-1/2. The housing shall be of such design as to assure a smooth flow over the entire effective weir length. An effective weir opening of at least 7-1/2" at the entrance throat shall be provided. When a circular weir is used, the housing shall accommodate at least a 4" diameter weir with a clearance of at least 2" between the weir lip and housing side.

4.01 WEIR: A weir shall be provided and shall be automatically adjustable and operate freely with continuous action to variations in water level over a range of at least 4 inches and at a flow rate of 30 gpm. Flap-type weirs shall have at least 7-1/4 inches of clear unobstructed weir width throughout its full operating range. Weirs shall be designed so as to develop an effective velocity over the full length of the weir. Weir design and construction shall be such that its action is positive, and such that clearance between weir side and housing side shall not exceed 1/8 inch at any point of its travel. The hinge construction shall be such that no appreciable leakage shall occur. Weir shall be firmly and positively attached to the housing, but shall be accessible for field replacement. Suitable devices shall be incorporated in the float basket or housing to eliminate binding of the weir.

NOTE: As adequate test information and data become available, a specific reference relating to effective velocity will be provided as follows: "The skimmer shall develop an effective velocity on swimming pool water surface at ____ feet from the weir opening."

Circular weirs shall have an effective diameter of at least 4 inches (12.5 inches in circumference) and be of such buoyancy and design as to develop an effective velocity on the swimming pool water surface around the circumference of the weir. Circular weir design and construction shall be such that its clearance to the housing does not exceed 1/16 inch and so that it may be accessible for replacement in the field.

4.02 STRAINER BASKET: An easily removable and cleanable basket or screen, with maximum openings of 1/4 inch diameter or equivalent area thereof, through which all overflow must pass shall be provided to trap solids. Its retentive capacity shall be at least 160 cubic inches with a minimum of 25% open area. When 3/4 of the open area is blocked, the equalizer valve shall remain closed.

4.03 In order to prevent cavitation and loss of prime skimmers shall be provided with a device or otherwise protected to prevent air entrainment in the suction line. The device shall perform when the water level drops as much as two inches below the lowest overflow level of the skimmer and the skimmer is operating at the designed flow rate (see Item 4.01). The device shall be designed so that, during normal operation leakage past the air lock protective device shall not exceed 10 per cent of the designed flow rate.

4.04 COVER AND MOUNTING RING: A removable cover with companion mounting ring shall be provided. Its design and construction shall be such that excessive deformation shall not occur when walked on or during installation. The cover shall be free of sharp edges and projections, shall have a suitable permanent non-slip finish, and shall be of such design and construction that it cannot be dislodged, unintentionally removed or otherwise become unstable during normal conditions of usage. A positive means of securing the cover in place shall be provided.

4.05 TRIMMER VALVES: Where trimmer valves are an integral part of the surface skimmer, their design and construction shall be such that they do not interfere with the performance of the unit as provided for in this Standard (Item 4.03).

4.06 VACUUM CLEANER CONNECTIONS: Where vacuum cleaner connections are an integral part of the surface skimmer, their design and construction shall be such that they are convenient for use, they do not interfere with normal operation when not in use, and do not interfere with the performance of the unit as provided for in this Standard (Item 4.03).

4.07 OPERATION AND INSTALLATION INSTRUCTIONS AND DATA PLATE:

4.071 INSTRUCTIONS: Instructions shall be provided with each unit and shall include: drawings, written instructions, charts and parts list sufficient to permit proper installation, operation and maintenance of the particular model of skimmer involved.

4.072 DATA PLATE:

4.0721 TYPE AND LOCATION: Data plates shall be of

permanent nature, so inscribed as to be easily read and understood, and securely attached or cast or stamped into the cover plate, or attached to the skimmer housing at a location readily accessible after skimmer installation.

4.0722 CONTENTS: Data plate shall contain the following information:

(1) Manufacturer
(2) Skimmer model number
(3) Minimum design flow rate in GPM
(4) Maximum design flow rate in GPM
(5) The data plate shall indicate as to whether the unit has been tested for fresh water only or for fresh water and salt water applications.

4.08 SAFETY DESIGN: The design and construction of the skimmer and component parts shall be such that they can be operated safely and shall be free of obstructions, sharp edges or projections that may be hazardous either to swimmers or maintenance personnel.

4.09 MECHANICAL OR MOVING PARTS:

NOTE: Material specifications are covered in SECTION 3. MATERIALS

4.091 ASSEMBLY: Component assembly shall be checked for adequacy of design to permit disassembly of parts for maintenance and repair.

4.092 MOVING PARTS: Moving parts shall be checked and, where possible, tested on an accelerated basis to determine the theoretical life expectancy which shall be no less than 5 years.

4.093 CLOSING AND SEALING DESIGN: Mechanical clamps, valves, gaskets, and tightening elements shall be checked for aptness of application and adequacy.

4.094 FUNCTION: The entire equipment and each component part shall be fully checked in actual operation to verify that the various functions are correctly and adequately performed. The manufacturer's instructions shall be carefully followed in this step-by-step operation.

* * *

RECOMMENDATIONS FOR INSTALLATION AND OPERATION

The following is not a basic part of the Standard and is not the responsibility of the manufacturer. However, to obtain satisfactory performance

the following limitations on installation and operation are recommended.

Skimmers may be applied to public swimming pools on the basis of 500 square feet of water surface area per unit or fraction thereof and to residential swimming pools on the basis of *800 square feet of water surface area per unit or fraction thereof. Where unusual shapes of pools are encountered, special considerations must be given the number of skimmers used. The required skimmers should be distributed to insure effective skimming of the entire surface; if possible, not less than one skimmer should be located on each side of the pool. Their location should also take into consideration the pool shape, prevailing winds and the circulation patterns within the pool. In this latter regard the return inlets should be sized to provide an inlet velocity of at least 10 ft/sec. for good mixing and to provide proper dispersal of return water and should be arranged to provide circulation patterns moving past the skimmers which will in turn aid the surface drift to the skimmers.

Skimming devices should be built into the pool wall with no protrusions beyond the face of the wall or above the deck, and for flap-type weirs the resulting throat should not be narrower than the skimmer weir. Skimmers should be accurately positioned as to grade to assure that the average operating water level occurs at the midpoint of the weir operating range.

Piping for skimmers should be designed for a capacity of at least 80% for public and 50% for residential pools of the required filter flow of the recirculation system, and in no case should it be less than 30 gallons per minute per skimmer, provided, however, that in pools having capacities of less than 16,000 gallons and surface areas of less than 500 square feet,the flow rates may be reduced proportionately. For multiple skimmer installations, each skimmer should be individually adjustable for flow. Single skimmers not equipped with an integral trimmer valve should be so installed as to facilitate the balancing of flow between the skimmer and the main outlet.

Strainer baskets should be cleaned regularly, daily or even more often, as required to insure proper performance. Clogged baskets impair the overall flow and, in some cases, can impair the free action of the weir with ultimate non-performance of the unit.

Skimmer weirs should be checked routinely for proper attachment to skimmer housing and for proper action.

Since skimmers are a direct inlet to the filter and recirculation lines, there is a tendency on the part of any person performing maintenance of the pool to place into the skimmer acids, alum, chlorine solution or powders and any other chemicals that may be used for water treatment. Such materials will seriously corrode a valve, tank, screen and other metal parts of the skimmers, as well as seriously damaging the piping system.

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*See paragraph 10.1 of the Proposed APHA Ordinance & Code for Public Swimming Pools.

The repair or replacement of the average skimmer after much misuse is an item of significant expense and the manufacturer should specifically advise against any such treatment procedures.